HELMHOLTZ ASSOCIATION

Grid @ DESY

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DESY

PoF Parallel Session

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Introduction

- DESY started to look into Grid computing end of 2003 (long) before participation in LHC and becoming a Tier-2
- The Grid was about to develop into a future *key technology*
- Distributed computing resources started to migrate into the Grid
- HERA experiments wanted to prepare for the *future*
- The Grid fits the global approach of international collaborations
- An LCG_2-1 Grid infrastructure was set up in 2004
  - VOs for H1 and ZEUS were founded
  - ILC, IceCube, and ILDG (Lattice QCD Data Grid) followed

Organization & Projects

- DESY has been operating a Grid infrastructure as a partner in the German/Swiss federation (DECH) of the EU project *Enabling Grids for E-sciencE* (EGEE) since 2004, deploying the middleware *gLite*.
- DESY is founding member of the German D-GRID project
- DESY is partner of the Physics at the Terascale Alliance of the Helmholtz Association (HGF) in Germany and fosters collaboration w/ universities in research and academia
- DESY is part of the *World-wide LHC Computing Grid* (WLCG) as a Tier-2 centre and supports ATLAS, CMS, and LHCb
- DESY is the home of the HERA experiments, is involved in ILC, and supports theory groups and astro-particle physics

Resources

- Grid resources are funded via various sources
  - DESY / HERA
  - DESY / Tier-2
  - DESY / others
  - D-GRID
  - NAF

- ATLAS Tier-2-Federation w/ U Göttingen
- CMS Tier-2-Federation w/ RWTH Aachen

- DESY Hamburg concentrates on ATLAS, CMS, H1, ZEUS, ILC, CALICE w/ *data repository* for testbeam and *Monte Carlo* data
  (LHC 43%, non-LHC 57%)

- DESY Zeuthen supports mainly ATLAS, LHCb, H1, IceCube, ILDG
  (ATLAS 54%, H1 17%, LHCb 15%, CALICE 6%, ZEUS 5%, ILC 3%)

Concepts

- DESY provides Grid services and Grid resources to a number of VOs of *various* disciplines; **ONE** Grid infrastructure for **ALL** VOs
- *Federating* resources among VOs and their group
- *Opportunistic* usage of resources
  - guarantees optimal usage of cycle and handles peak loads
  - provides shares according to pledges via *fair shares* (MoU)
  - limits maximal number of jobs
- The Grid infrastructure is deployed and operated as a part of the IT infrastructure at DESY, using its facilities and personnel

Grid Infrastructure …

- Two DESY Grid sites
  - **DESY-HH** `ldap://grid-giis.desy.de:2170/mds-vo-name=DESY-HH,o=grid`
  - **DESY-ZN** `ldap://lcg-giis.ifh.de:2170/mds-vo-name=DESY-ZN,o=grid`

- VOs at DESY:
  - Hosted at DESY:
  - Global: '*hone*', '*ilc*', '*xfel.eu*', '*zeus*'
  - Regional: '*calice*', '*ghep*', '*ildg*'
  - Local: '*desy*', '*hermes*', '*icecube*'

  - Hosted elsewhere:
  - Global: '*atlas*', '*biomed*', '*cms*', '*lhcb*'
  - Regional: '*dech*', '*xray.vo.egee-eu.org*'
  - Operations: '*dteam*', '*ops*'

- Grid Core Services:
  - VOMRS/VOMS, LFC, AMGA, top-level-BDII, 11 WMS

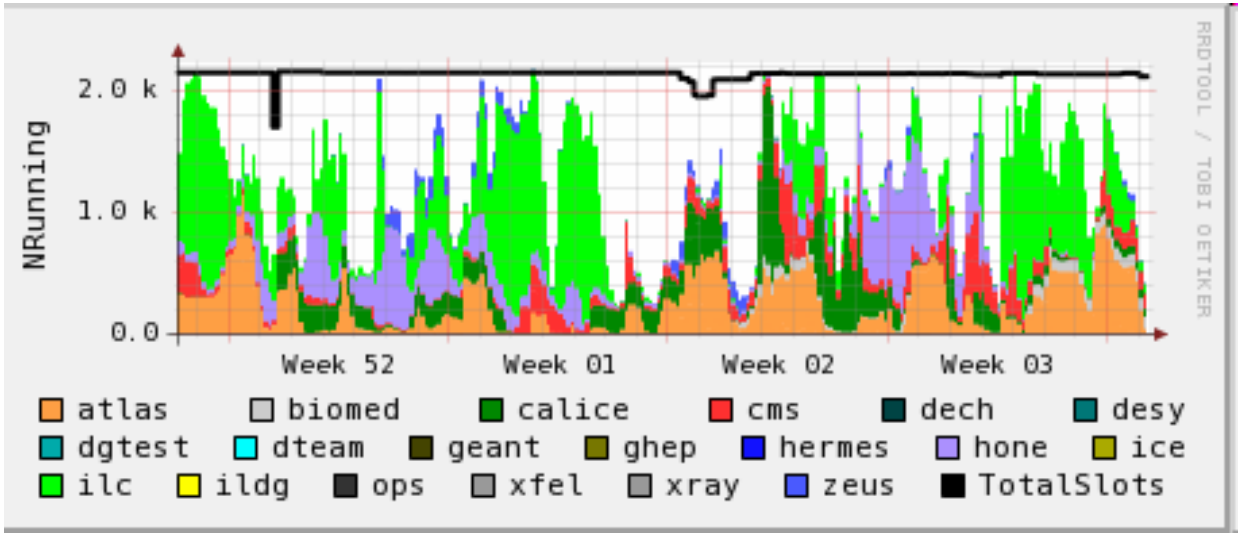
… Grid Infrastructure

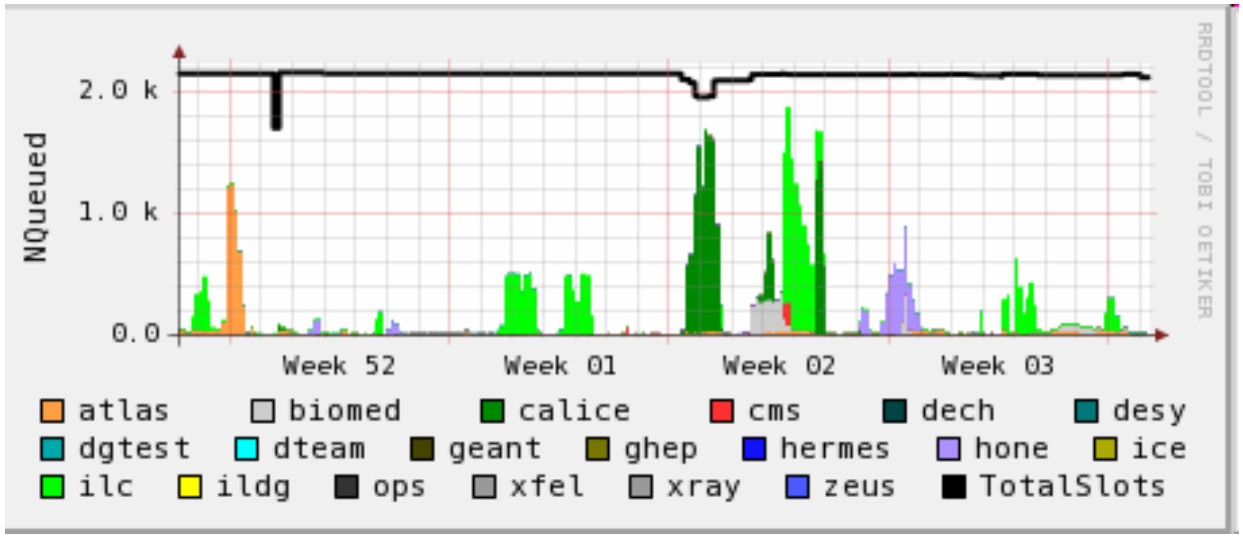
- Computing Resources: (CE) [SL47, 32-bit / 64-bit]
  - `grid-ce3.desy.de` — 2158 slots @ 373 hosts
  - `lcg-ce1.ifh.de` — 450 slots @ 99 hosts
  - DESY total: >5000 kSI2k

- Storage Resources: (SE) (dCache) [SL5]
  - `dcache-se-atlas.desy.de` — ATLAS: 180 TB
  - `dcache-se-cms.desy.de` — CMS: 160 TB
  - `dcache-se-desy.desy.de` — others: 120 TB
  - `lcg-se0.ifh.de` — ATLAS: 300 TB
  - `lcg-se1.ifh.de` — LHCb: 50 TB
  - `globe-door.ifh.de` — others: 100 TB
  - DESY total: ~1000 TB

Usage ...

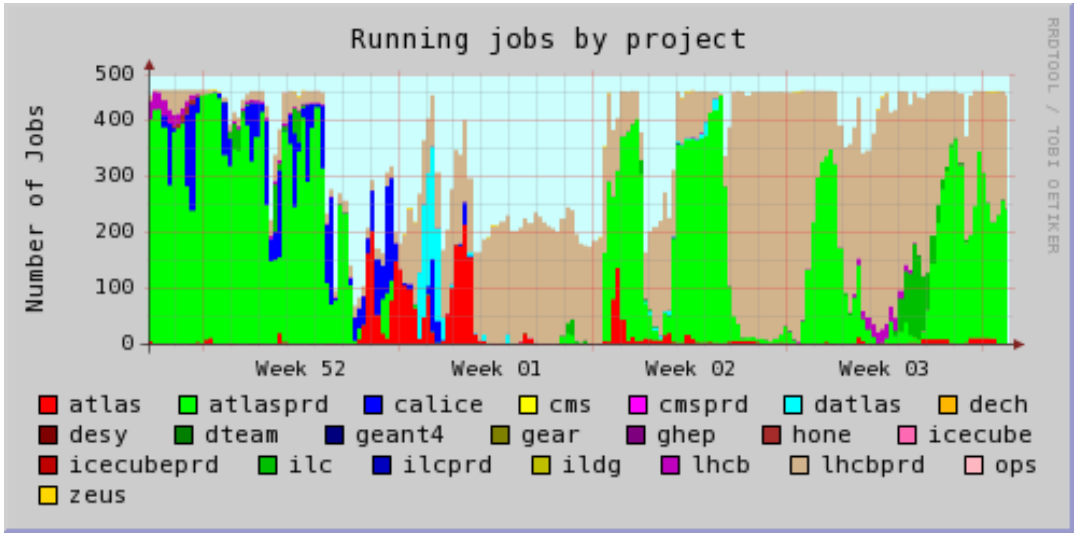
Jobs at DESY-HH Dec/Jan 2008/09

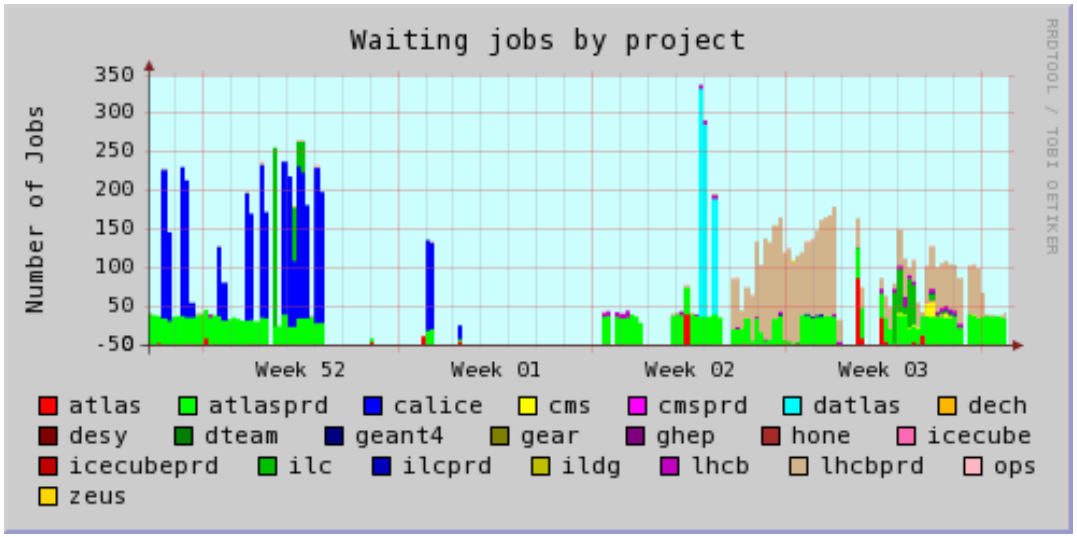




... Usage ...

Jobs at DESY-ZN Dec/Jan 2008/09





… Usage (beyond LCG)

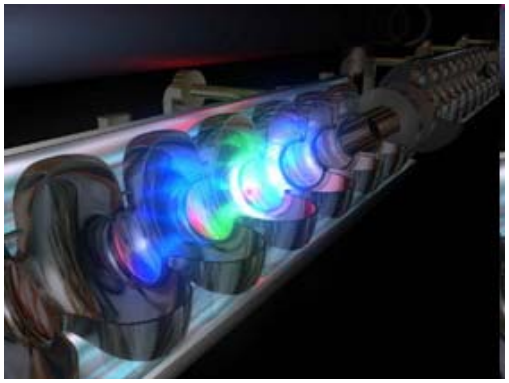
- H1 is supported by ~ 20 sites
  - 2008: 2.5 G events Monte Carlo
  - (25% DESY, 70% WLCG, 5% non-Grid)
- ZEUS is supported by ~30 sites
  - 2008: 905 M events Monte Carlo
  - (78% Grid, 22% non-Grid)
- CALICE is supported by ~20 sites
  - Testbeam data are primarily stored at DESY via Grid on tape
  - Replication to IN2P3 (Lyon) and KEK
- ILC is supported by ~25 sites
  - ILC produced 45 M events (~300 cpu*y @ 70 TB)
  - Partial replication to IN2P3 (Lyon) and KEK

DESY

"DESY conducts basic research in the natural sciences with special emphasis upon accelerators, photon science and particle physics."

http:///www.desy.de/

http://www.xfel.eu/

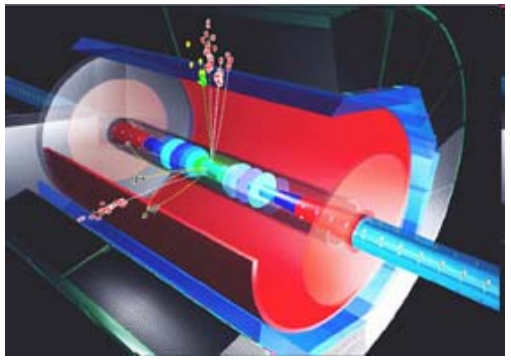


Accellerators

Petra III
XFEL
ILC

Photon Science

FLASH
Petra III
CFEL
XFEL



HEP

H1,HERMES,ZEUS
ATLAS,CMS
ILC
IceCube
Theory, ILDG

The VO *'xfel.eu'*

- A VO for the future XFEL free electron laser
- Of interest for the FLASH / Petra3 community as well

- Needs of the synchrotron community are *fundamentally* different:
  - No tradition in big global collaborations
  - Short term experiments (days) and users (come-and go)
  - Many/fully independent users
  - Little/no sharing of data
  - Beginning awareness of (scaling) problems in computing

  - No VOs in the sense of HEP
  - UIs must be multi-platform or web portal based
  - (very) easy to use infrastructure required

- Collaboration w/ ESRF in VO '*xray.vo.eu-egee.org*'

Conclusions

- DESY considers Grid computing as a *key technology* for e-Science
- Computing resources are Grid-based
- LHC depends on the Grid

- DESY has been operating an *independent* Grid infrastructure for many years in the context of EGEE, D-Grid and the HGF Alliance

- DESY is the home of many *global* VOs in e-Science
- Those VOs have been using the Grid extensively

- All VOs are supported on one Grid infrastructure!
- Support is a major issue!

- DESY is offering its Grid infrastructure as well as its Grid know-how to new communities and groups

The VO '*xfel.eu*'

- DESY founded the VO '*xfel.eu*'

- All necessary core services are available:
  - VOMS: `grid-voms.desy.de (soon)`
  - LFC: `grid-lfc.desy.de`
  - AMGA: `grid-amga0.desy.de`
  - WMS: `xfel-wms.desy.de`

  - CE: `grid-ce3.desy.de`
  - SE: `dcache-se-desy.desy.de`

- probably Data Grid only
- Investigating use cases

The VO '*xray*'

- ESRF initiated a project to study '*Grid for Synchrotron'*
- ESRF founded the VO '*xray.vo.eu-egee.org*'
- By now 2 sites support '*xray*': ESRF and DESY-HH
- All necessary core services are available:
  - VOMS: `grid-voms.esrf.eu`
  - LFC: `grid-lfc.desy.de`
  - AMGA: `grid-amga0.desy.de`
  - WMS: `xray-wms.desy.de`
    `wms1.egee.fr.cgg.com`
  - CE: `grid-ce3.desy.de`
  - SE: `dcache-se-desy.desy.de`